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# OBSERVATIONS ON THE WETLAND ECOSYSTEM OF KABAR LAKE IN BEGUSARAI, BIHAR, WITH SPECIAL REFERENCE TO VEGETATION

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## ABSTRACT

The article presents the results of observations on vegetation, flora, fauna, human habitations and environment of the wetland ecosystem of Kabar Lake and surrounding areas in the district of Begusarai, Bihar.

## INTRODUCTION

In the Second Meeting of the Expert Committee on Flora of the Indian Board of Wildlife held at Dehra Dun in May 1983, the importance of studies on wetland ecosystems was stressed for conservation of their unique flora and fauna. In the said meeting, the Kabar Lake of Bihar was suggested to be taken up for such study by the Botanical Survey of India, on a priority basis. Accordingly an exploration trip was conducted by the Ecology Section, of the Survey in December 1983 and a thorough study of the vegetation of the ecosystem was made. Some observations were also made on the resident and migratory birds and local inhabitants. At the same time the Scientists of the Zoological Survey of India were engaged with the study of birds, fishes and other animals in and around the lake. The D.F.O. Wildlife, Ranchi was simultaneously making a socio-economic survey of the Sahnis residing in the locality.

## LOCATION

The Kabar Lake and the adjoining chaurs are located in Cheria Bariarpur, Bakhari blocks of Begusarai district. There are a number of chaurs besides Kabar Lake, such as Nagree Jheel, Bikrampur Chaur etc. The area is surrounded by the river Burhi Gandak in the west and south and N. E. Railway line from Samastipur to Khagaria in the north and east.

## KABAR LAKE

The Kabar Lake is situated at about 22 km north of Begusarai town and is under Cheria Bariarpur P.S. of Begusarai district. It comprises portions of villages of Jaimanglagarh, Rajaur, Parora, Narainpipar, Sonbasa, Kumbhi and Sakarbasa with a water-spread-up area of about 21 sq. km during the month of October. In the rainy season the water increases in depth as well as in area and in winter and summer months the water dries up, resulting in shallowness and shrinkage of the lake. In the south east corner there is an island called Jaimanglagarh, covering an area of about ¾ sq. km, which is named after the presiding deity Jaimangla Kali. The place is of some historical importance and pilgrims from distant places congregate here for worship. On the west of Kabar, there is another chaur, locally called Nagree Jheel, having a water-spread up area of 5.50 sq. km after rains. It comprises portions of villages Mohanpur, Manjhaul and Yakabpur. This chaur drains into the Kabar Lake through a channel called Sudhia-baha.

To recognise different areas of the lake,

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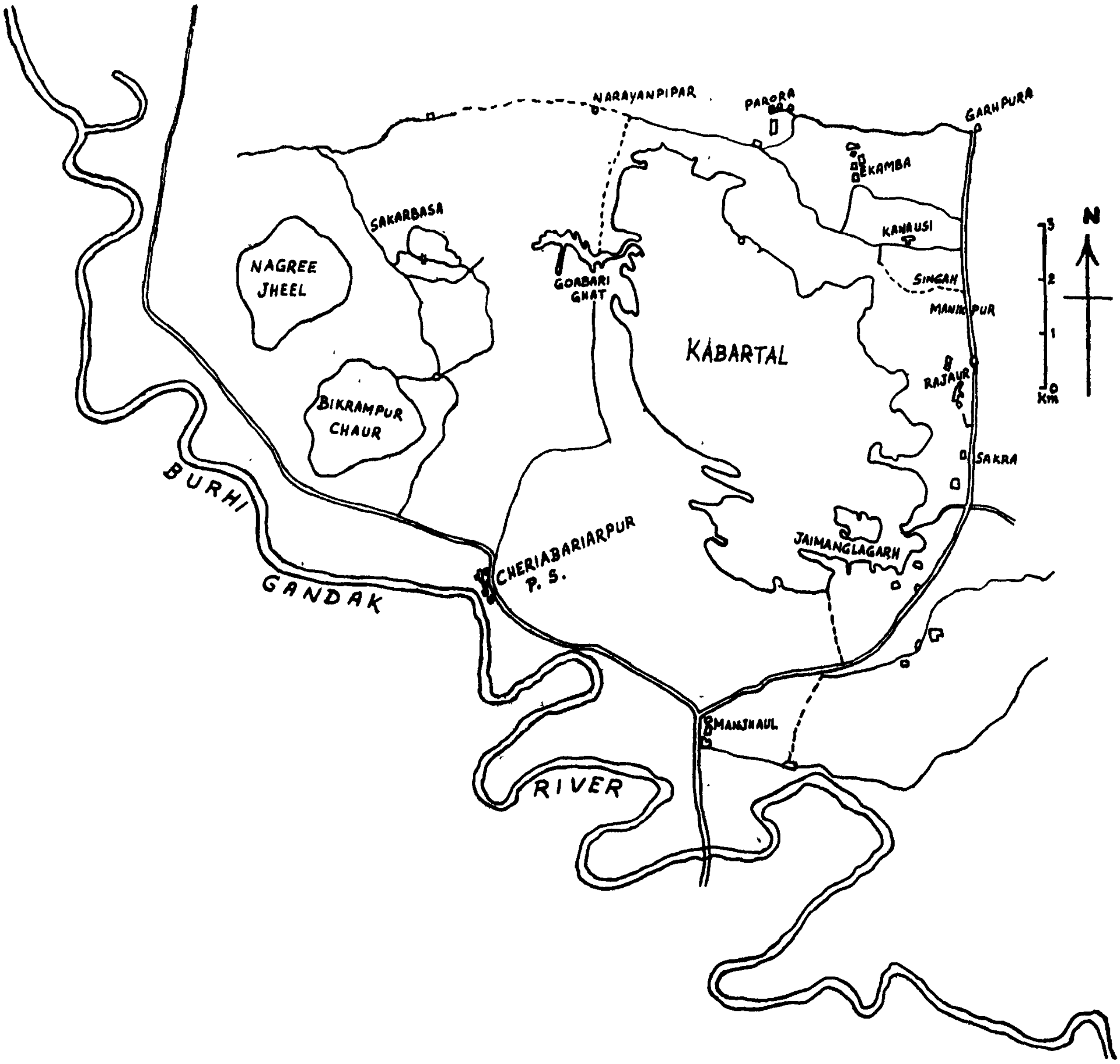

Map of Kabar Lake and adjacent areas in Bihar

the local people have named the different places. In the southern portion starting from Jaimanglagarh towards north the places are called Ajebi, Kathahi, Nahar, Banchahi, Sudhia, Banderi, Bhaisiahi and Chatar. These places were shallower having a depth of 1-3 metres. Towards the centre of the lake, the places are called Mahalaya, Kochala, etc., where the depth of water reaches 4-6 metres. The maximum depth was found to be 6 metres in December. The western side of the lake was approached through Goabari Ghat and some places such as Amra, Larkatia were visited having a depth of 2-3 metres. The northern side of the lake was approached from Parora village and this side of the lake was found to be very shallow and water was only half a metre to a metre deep.

## VEGETATION AND FLORA

A profuse growth of aquatic vegetation was observed in the lake. Only in a few places, the water is left without surface vegetation. In these places also a dense growth of submergent vegetation can be seen. It really looks beautiful to row on the clear water with the dense submerged vegetation presenting a view of submerged hill ranges.

The predominant vegetation can be classified into the following categories : 1. Rooted at the bottom. 2. Suspended in water. 3. Free floating.

1. Rooted at the bottom : Plants which are rooted at the bottom may be (a) Submerged or (b) Emergent.

(a) *Submerged :* Profuse growth of *Chara* sp. was observed in some places. *Hydrilla verticillata, Potamogeton crispus, Nechamandra alternifolia, Vallisneria spiralis* were seen growing under the water surface. Plants like *Nelumbo nucifera* and *Nymphaea stellata* are rooted in the lake bed but the leaves float on the water surface and the flowers bloom above the water surface. *Ottelia alismoides, Alisma indica* were also found here and there. Submerged algae forming balls or clusters of various shapes were found in plenty attached to other submerged plants. Some of these algae belong to Cyanophyceae and the majority of the algal genera, *viz. Bulbochaete, Chara, Coleochaete, Cosmarium, Oedogonium,* etc. belong to Chlorophyceae.

(b) *Emergent :* Pure association of *Phragmites karka,* the reed densely fills several areas of the lake, projecting about a metre above water surface, and mostly flowering in the winter season. The compact association of the grass with dense panicles serve as a favourable habitat for various species of spiders and other insects. Pure association of *Scirpus articulatus* was found in shallow water but not flowering in Kabar Lake. However a few flowering *Scirpus* were found in Nagree Jheel in December. Other emergent species were *Panicum* sp., *Hygroryza aristata* and *Oryza sativa* varieties.

Some marginal plant communities near the banks, though rooted at the bottom, may be called semi-aquatic or marsh plants, and are characterised with species such as *Aeschynomene indica, Ipomoea aquatica, Phyla nodiflora, Marsilea quadrifolia, Polygonum hydropiper, Hygrophila auriculata* and *Bacopa monnieri.*

2. Suspended in water : *Myriophyllum tuberculatum, Utricularia inflexa* var. *stellaris, Utricularia* sp. were found suspended inside the water, of which the flowers of *Utricularia* were visible on water surface.

3. Free floating : The exotic water hyacinth (*Eichhornia crassipes*) is a macrophytoplankton, which was found in small patches in some areas of the lake, and is probably cleared by the Sahnis for their paddy cultivation. *Nymphoides cristatum* and *N. indicum* were seen growing in different places in the lake. *Azolla pinnata* was found near Goabari ghat. Among the microplanktons, mention may be made of *Cosmarium* sp., *Anabaena* sp., and other floating algae.

The wild terrestrial vegetation on the banks of the lake and surrounding areas was found to be composed of trees such as *Azadirachta indica, Eugenia* sp., *Barringtonia acutangula, Ficus glomerata,* etc, and some shrubs of *Murraya paniculata, Clerodendrum* sp., *Calotropis gigantea* etc. The herbaceous plants were represented by *Ageratum conyzoides, Polygala chinensis, Solanum xanthocarpum, Smilax* sp., *Phyllanthus* sp., *Abelmoschus esculentus, Anisomeles ovata, Vernonia cinerea, Capparis horrida, Hemigraphis hirta, Ocimum sanctum, Phyla nodiflora, Desmodium* sp., *Scoparia dulcis, Blumea* sp., *Argemone mexicana, Croton bonplandianum* etc.

## CULTIVATION BY THE SAHNIS

Several varieties of paddy (*Oryza sativa*) locally called Dasseria, Barobar, Bakol, Badsar, Meghnad, cultivated in the lake, remain about a metre above water surface and 1-2 metres under the water at the time of harvest. The thick grains are consumed by he Sahnis. Other crops cultivated by them in the surrounding banks of the lake include Sugarcane (*Saccharum officinarum*), Potato (*Solanum tuberosum*), Brinjal (*Solanum melongena*), Chillies (*Capsicum annuum*), Maize (*Zea mays*), Mustard (*Brassica campestris*), Rahar (*Lathyrus sativus*), Castor (*Ricinus communis*) and Sweet potato (*Ipomoea batatas*). An area was full of *Dalbergia sissoo* plantation.

### CONSERVATION OF THE HABITAT AND ITS DEVELOPMENT AS A BIRD SANCTUARY

Bird hunting, fish catching etc. must be prohibited and the local people must be made aware of the importance of conservation. Most of the birds being killed here are included in the schedule of the Wildlife (Protection) Act, 1972, thereby rendering the practice illegal. But it appears that none of the villagers is aware of the fact. That is why Conservation education programmes are necessary. To give shelter to the birds some fast growing trees may be planted around the lake, which may provide suitable breeding and nesting places of some rare birds which have to go to a long distance for breeding purpose. It should be kept in mind that such a beautiful habitat must be protected from destruction, and efforts should be made to develop it as a National Bird Sanctuary.

### SOCIO-ECONOMIC ASPECTS

Several thousands of families of fishermen, locally called the Sahnis reside around the lake and their livelihood, except for cultivation of some crops as mentioned earlier, comprises mainly of fishing and bird-catching. Boating is indispensable for their daily life. They consume the aquatic paddy varieties, the grains of which are somewhat thicker, and the crops which are cultivated on the banks of the lake. They keep cattle for milk and often catch fishes from the lake. Sometimes they fix long nets on series of bamboos to catch migratory birds coming in large number on the lake water. Such birds are sold at the local market at Manjhaul at a price of Rs. 10.00 to Rs. 40.00 per bird according to size and variety. Some birds are also sent to the Begusarai and Barauni markets. If these activities are stopped for conservation purpose, the means of livelihood of the villagers will be seriously disturbed. So arrangements must be made for their alternative sources of income.

### ENUMERATION OF PLANTS IN AND AROUND THE KABAR LAKE

Menispermaceae : *Stephania hernandifolia* Walp. 14211.

Nymphaeaceae : *Nelumbo nucifera* Gaertn. 14279, *Nymphaea stellata* Willd. 14265, 14275, 14291, *Nymphaea* sp. 14276.

Capparaceae : *Cleome gynandra* Linn. 14320, 14263.

Malvaceae : *Abelmoschus moschatus* Medic. 14309, *Abutilon indicum* (Linn.) Sweet 14224, *Malachra capitata* Linn. 14298, *Sida acuta* Burm. f. 14202, *Sida humilis* Willd. 14214, *Urena lobata* Linn. 14203.

Sterculiaceae : *Melochia corchorifolia* Linn. 14240.

Tiliaceae : *Corchorus aestuans* Linn. 14242.

Rhamnaceae : *Ziziphus mauritiana* Ham. 14321.

Leguminosae : *Aeschynomene indica* Linn. 14243, *Biophytum sensitivum* (Linn.) DC 14222, *Cassia occidentalis* Linn. 14208, *Crotalaria verrucosa* Linn. 14302, *Desmodium gangeticum* DC. 14312, *Desmodium triflorum* DC. 14327, *Indigofera linifolia* Retz. 14304, *Neptunia prostrata* (Lamk.) Baill. 14339, *Sesbania paludosa* Prain 14280, 14256, *Tephrosia hamiltonii* J. R. Drumm. 14323, *Teramnus labialis* Spreng. 14316, *Vicia sativa* Linn. 14322.

Haloragidaceae : *Myriophyllum tuberculatum* Roxb. 14252.

Lecythidaceae : *Barringtonia acutangula* Gaertn. 14324.

Onagraceae : *Ludwigia adscendens* (Linn.) Hara 14268, *Ludwigia perennis* Linn. 14216.

Cucurbitaceae : *Benincasa hispida* Cogn. 14332, *Bryonopsis laciniosa* (Linn.) Naud. 14245, *Coccinia indica* (Naud.) W. & A. 14226, *Luffa acutangula* Roxb. 14313, *Luffa echinata* sp. 14295.

Rubiaceae : *Oldenlandia corymbosa* Linn. 14232, *Oldenlandia diffusa* Roxb. 14246.

Compositae : *Ageratum conyzoides* Linn. 14206, *Eclipta alba* Linn. 14342, *Caesulia axillaris* Roxb. 14217, *Vernonia cinerea* Less. 14225, 14315.

Apocynaceae : *Tabernaemontana citrifolia* Linn. 14300.

Menyanthaceae : *Nymphoides cristatum* (Roxb.) O. Ktze. 14236, *Nymphoides indicum* (Linn.) O. Ktze. 14256.

Boraginaceae : *Trichodesma indicum* (Linn.) Lehm. 14341, *Heliotropium indicum* Linn. 14219.

Convolvulaceae : *Ipomoea aquatica* Forsk. 14210, *Ipomoea chryseides* Ker-Gawl 14277, 14333, *Merremia emarginata* (Burm. f.) Hall. f. 14215.

Solanaceae : *Solanum indicum* Linn. 14227, *Solanum nigrum* Linn. 14266, *Solanum xanthocarpum* Schrad & Wendl. 14213.

Scrophulariaceae : *Bacopa monnieri* (Linn.) Pennell 14278, *Limnophila gratioloides* R. Br. 14239, *Limnophila racemosa* Benth. 14257, *Scoparia dulcis* Linn. 14310.

Lentibulariaceae : *Utricularia inflexa* var. *stellaris* (Linn. f.) Taylor 14231.

Pedaliaceae : *Martynia annua* Linn. 14221.

Acanthaceae : *Asystasia gangetica* T. Anders. 14314, *Hygrophila auriculata* (Schum.) Haines 14334, *Hygrophila polysperma* T. Anders. 14342, *Peristrophe bicalyculata* (Retz.) Nees 14205, *Rungia parviflora* Nees 14306, 14307.

Verbenaceae : *Phyla nodiflora* (Linn.) Greene 14311.

Labiatae : *Anisomeles indica* (Linn.) O. Ktze. 14289, 14304, *Leucas aspera* Spreng. 14274, *Leucas lavandulaefolia* Rees 14207, *Ocimum basilicum* Linn. 14330, *Ocimum sanctum* Linn. 14218.

Amaranthaceae : *Achyranthes aspera* Linn. 14220, *Aerva lanata* (Linn.) Juss. 14204, *Alternanthera sessilis* (Linn.) DC. 14233, *Alternanthera* sp. 14301, *Amaranthus tenuifolia* Willd. 14340, *Digera muricata* (Linn.) Mart. 14228.

Chenopodiaceae : *Basella rubra* Linn. 14331, *Chenopodium album* Linn. 14261, *Chenopodium murale* Linn. 14269.

Polygonaceae : *Polygonum hydropiper* Linn. 14241.

Euphorbiaceae : *Croton bonplandianum* Baill. 14240, *Euphorbia hirta* Linn. 14326, *Phyllanthus urinaria* Linn. 14329.

Moraceae : *Ficus heterophylla* Linn. f. 14319.

Hydrocharitaceae : *Ottelia alismoides* (Linn.) Pers. 14235, 14237, 14238, 14259, 14336, *Hydrilla verticillata* (Linn. f.) Royle 14335, 14253, 14270, *Vallisneria spiralis* Linn. 14293, *Nechamandra alternifolia* (Roxb.) Thw. 14287.

Liliaceae : *Smilax zeylanica* Linn. 14308.

Pontederiaceae : *Monochoria hastata* (Linn.) Solms 14342.

Commelinaceae : *Commelina diffusa* Burm. f. 14299, *Commelina communis* Cl. 14318.

Alismataceae : *Caldesia parnassifolia* (Linn.) Parl 14267.

Potamogetonaceae : *Potamogeton crispus* Linn. 14294, *Potamogeton nodosus* Poir 14255.

Najadaceae : *Najas minor* All. 14288.

Cyperaceae : *Cyperus iria* Linn. 14303, 14230, *Cyperus pumilus* Linn. 14209, *Cyperus rotundus* Linn. 14229, *Fimbristylis diphylla* Vahl 14212, *Fimbristylis woodrowii* Cl. 14201, *Juncellus alopecuroides* Cl. 14250, *Scirpus articulatus* Linn. 14271, 14337, *Scirpus supinus* Linn. 14338.

Gramineae : *Coix lachryma-jobi* Linn. 14292, *Dichanthium annulatum* (Forsk.) Stapf 14328, *Dactyloctenium aegypticum* (Linn.) Beauv. 14234, *Echinochloa colonum* (Linn.) Link 14223, 14325, *Eragrostis nutans* (Retz.) Nees 14283, *Hygroryza* *aristata* (Retz.) Nees 14273, *Oryza sativa* Linn. 14286, 14258, *Panicum miliaceum* Linn. 14297, *Panicum paludosum* Roxb. 14249, *Panicum repens* Linn. 14285, 14244, *Paspalum orbiculare* Forst. 14281, *Paspalidium punctatum* (Burm.) A. Camus 14262, 14282, *Phragmites karka* (Retz.) Trin. 14248, *Sacciolepis myosuroides* (R. Br.) A. Camus 14272, 14284, 14264.

Marsileaceae : *Marsilea quadrifolia* Linn. 14317.

Cyanophyceae : (Genera) *Aulosira, Merismopedia, Scytonema, Spirulina, Tolypothrix.*

Chlorophyceae : *Bulbochaete* (2 spp.) *Chara, Coleochaete, Cosmarium* (6 spp.), *Cylindrocapsa, Desmidium* (2 spp.), *Euastrum* (3 spp.), *Microsterias* (2 spp.), *Oedogonium* (4 spp.), *Oocystis, Pleurotaenium, Staurastrum, Tetraedron.*

## FAUNA OF THE LAKE

The Kabar Lake and the surroundings, having diverse ecological niches, provides a suitable habitat for a rich assemblage of fauna. In addition to the innumerable invertebrates, 30 species of fishes, 4 species of frogs, 5 species of snakes and lizards and 6 species of mammals were recorded.

The Birds of the Kabar Lake may be classified into two groups : Residential and Migratory. Some birds are vegetarian, some are non-vegetarian, and there are some who take both plant and animal materials as their food.

Among the resident birds, Black Drongo (*Dicrurus adsimilis* Bechsten), Little Egret (*Egretta garzetta* Linn.), Cattle Egret (*Bulbucus ibis* Linn.), Night Heron (*Nycticorax nycticorax* Linn.), Indian moorhen (*Gallinula chloropus* Linn.), White breasted waterhen (*Amaurornis phoenicurus* Pennant), Painted Snipe (*Rostratula benghalensis* Linn.), Pheasant tailed Jacana (*Hydrophasianus chirurgus* Scop.), Red wattled lapwing (*Vanellus indicus* Boddaert) and Pond Heron (*Ardeola grayii* Sykes) are noteworthy.

Some of the migratory birds include Coot (*Fulica atra* Linn.), Spotted Sandpiper (*Tinga glariola* Linn.), Lesser Whistling Teal (*Dendrocygna javanica* Horsfield), Watercock (*Gallicrex cinerea* Gmel.), Little Cormorant (*Phalacrocorax niger* Vieillot), Common Sandpiper (*Tringa hypoleucos* Linn.), Pintain Snipe (*Gallinago stenura*), Black ibis (*Pseudibis papillosa* Temminck), Red crested Pochard (*Netta rufina* Pallas), Tufted Pochard (*Aythia fuligula* Linn.), Little Grebe (*Podiceps ruficollis* Pallas) and Shoveller (*Anas clypeata* Linn.).

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